

# Taking the Plunge from Classroom Teaching to Technology Enhanced Learning at a Residential University

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## Abstract

This article evaluates a residential higher education institute's (HEI) implementation of laptops as part of Technology Enhanced Learning (TEL) to Virtual Generation students at a small faculty. The study population comprised 36 first year Humanities students, between the ages of 19-43, the Faculty Dean, and the lecturers of six first year modules. Over a period of one year, the qualitative case study collected data using various data collection strategies: semi-structured interview with the dean, semi-structured individual interviews with purposefully selected students, semi-structured focus groups discussions with lecturers and students, and an open-ended questionnaire. An integrated dataset captured the transcribed interviews as a hermeneutic unit in Atlas.ti™, a computer-based qualitative data analysis software. The researchers coded and categorised the textual data into four themes according to the constant comparative analysis method. Findings relate to the use of laptops as learning tools: (i) students' experiences of technology; (ii) improving teaching and learning, (iii) technology issues; and (iv) project outcomes. The themes relating to campus-based TEL experience of students comprised six areas, grouped as two patterns. While e-communication, Internet access and comperacy constituted the customary background aspects, students, lecturers and course material were the main concerns that required support to enhance the teaching and learning experiences of students at this residential campus.

## Keywords

*Technology Enhanced Learning (TEL); Laptop Project; Qualitative Case Study; Virtual Generation, Computer Attitude Survey (CAS); Higher Education (HE); Constant Comparative Analysis*

## Introduction

The Virtual Generation students, born after the 1980s, currently enrolled at higher education institutions (HEIs), instigated major technological and social changes which effected implications for teaching and learning. Reverting to the use of new (and some not so

new) Information and Communication Technology (ICT) devices, e.g. laptop computers, iPads, smartphones, tablets, and android devices as learning technologies, holds implications for higher education (HE) teaching pedagogies. This implies change beyond verbal and visual learning to a virtual way of teaching and learning. Traditional learning principles should be revisited and adapted accordingly (Proserpio and Gioia, 2007; Njenga and Fourie, 2010) to develop teaching and learning strategies that incorporate the strengths and opportunities of online learning with those of more traditional modes of learning (Emerson and MacKay, 2010).

The use of technology to enhance teaching and learning relates to the making, modification, use, and knowledge of tools, techniques, systems, and methods in order to solve problems (Piccoli, Ahmad, and Ives, 2001). The shift of HEIs towards technology enhanced learning (TEL) should be cautiously explored. The persuasive claims about the advantageous use of e-learning only should be thoroughly evaluated (Njenga and Fourie, 2010; Proserpio and Gioia, 2007) as it is not yet clear what effect the change of mode of learning has on students' course satisfaction and achievement (Emerson and MacKay, 2010). The impact of mode of learning (traditional face-to-face classroom learning, web based learning, web-enhanced classes) on students' achievement, range from (i) fairly positive (Wurst, Smarkola, and Gaffney, 2008); to (ii) no substantial difference (Rivera and Rice, 2002); to (iii) impeding or even negative (Mottarella, Fritzsche, and Parrish, 2004; Emerson and MacKay, 2010; Tang and Austin, 2009; Fried, 2008). However, there is a daily increase in the influence of new technologies on the Virtual Generation, the "people from multiple demographic age groups who make social connections online—

through virtual worlds, in video games, as bloggers, in social networks, or through posting and reading user-generated content at e-commerce sites like Amazon.com" (Sarner quoted by Havenstein, 2007). Teaching the Virtual Generation compels lecturers to consider their students' "learning styles, perceptual modality preferences and computer or Internet proficiency when introducing technology into their teaching" (Tang & Austin, 2009, p. 1252). These changes lead to additional challenges for teaching and learning, since the roles of students and lecturers during course communication have changed (Wurst, Smarkola, and Gaffney, 2008). "It is not the technology, but the instructional implementation of the technology that contributes to learning effectiveness" (Tang & Austin, 2009, p. 1243). These changes are inherently advantageous as "the combination of these technologies may enhance professors' overall teaching effectiveness" (Tang & Austin, 2009, p. 1252).

The Internet, with its quick access to a wealth of information, can be seen as a double-edged sword (Proserpio and Gioia, 2007) because easy access to information does not mean that students recognize the trustworthiness of sources. This reservoir of information does not necessarily lead to meaningful knowledge creation and demands much more from lecturers to ensure the transformation of information into knowledge (Guri-Rosenblit, 2005). The availability of modern technologies does not imply educational usage thereof (Proserpio and Gioia, 2007). This statement highlights the importance of the compatibility of ICT with the users, their preferences, and the way technology is implemented. A wireless Internet (Wi-Fi) enabled classroom may be a temptation for students to let their attention wander from the course content. Filtering of Internet connections in classroom could provide a solution to this problem, but could also diminish student motivation (Fried, 2008; Proserpio and Gioia, 2007; Wurst, Smarkola, and Gaffney, 2008).

TEL could be promising, especially in undergraduate classes, in the sense that the focus should be on fostering critical learning, less on content, and more on critical thinking and problem-solving skills (Proserpio and Gioia, 2007). Information overload could become a hornets' nest when introducing multimedia learning, resulting in less learning and understanding (Rockwell and Singleton, 2007; Mayer, Heiser, and Lonn, 2001).

### *Technology Enhanced Learning*

When traditional HE classroom teaching and web-based learning are viewed as two extremities on a

scale, adopting a blended approach to learning is an evolutionary move towards online learning. Changing towards TEL (Garrison and Kanuka, 2004) at an accelerating speed becomes inevitable (Tang and Austin, 2009). TEL is "characterized as maximizing the best advantages of face-to-face learning and multiple technologies to deliver learning" (So & Brush, 2008, p. 321). Lecturers have to become creative in the redesigning of their courses to actively integrate technology for learning (Wurst, Smarkola, and Gaffney, 2008; Tang and Austin, 2009; Emerson and MacKay, 2010) in order to create new innovative learning opportunities for their students (Proserpio and Gioia, 2007). Technology integration in HE demands major changes in the way lecturers view technology as well as teaching and learning (Salinas, 2008). Lecturers "have to select the best combination of technologies, assignments, and materials in order to achieve the highest amount of learning. A good match between materials and technology leads to student learning, satisfaction, and good teaching evaluation" (Tang & Austin, 2009, p. 1252). Research in HE should therefore focus on students' perceptions concerning the use of technology in teaching and learning (Tang and Austin, 2009) to be able to address questions concerning students' satisfaction with their education experience and the effect on learning goals and outcomes. However, understanding how students accept a technology-driven teaching and learning environment is important for successful implementation of such a system (Abbad, Morris, and de Nahlik, 2009; Proserpio and Gioia, 2007). "There is a strong need to develop a fuller understanding of the impacts of these and newer technologies on university students and on education" (Tang & Austin, 2009, p. 1252).

This paper aims to provide understanding of a residential HEI's endeavour to move towards using learning technologies to foster high-quality student learning, facilitate first-rate teaching, and to provide students with optimal teaching and learning. The question that this paper addresses is: What were the issues relating to the use of laptops during the implementation of technology enhanced learning (TEL) at a Faculty of Humanities?

### Research Design and Methodology

#### *Context of the Study*

The Teaching and Learning Committee of the North-West University (NWU) launched a pilot study to determine the feasibility of issuing laptops to all students on the Potchefstroom Campus. They targeted

the smallest faculty on the Potchefstroom campus, and at the onset of the 2011 academic year all first year students received a custom loaded laptop computer containing anti-virus software, MS Office™, OneNote™, and several e-books. The computers were linked to the NWU wireless Internet network that gave the students access to e-Fundi (a Sakai™-based e-learning platform), the university's learning management system, which provided links to an email account, the library's resource database, electronic study guides, communication with lecturers, discussion forums, technical assistance, posting of assignments, and online assessment. In spite of contradictory literature indications, the Committee aimed to determine if the Virtual Generation students perceived their teaching and learning experience to be positive (Njenga and Fourie, 2010; Kirkwood and Price, 2005; Fried, 2008; Mottarella, Fritzsche, and Parrish, 2004; Tang and Austin, 2009; Wurst, Smarkola, and Gaffney, 2008). The Committee also aspired for improved student achievement as a positive spin-off from the laptop project.

The Faculty's strategic plan aligns with the change towards technologically driven teaching and learning and its competitive advantages for the global market (Rice and Aydin, 1991). The Dean's vision is to gradually evolve ICT into teaching and learning, shifting the current instructivist teaching paradigm to a learner-centred approach (Salinas, 2008), and changing lecturers' and students' perceptions about dealing with information and content, thereby establishing a new partnership between teaching and learning at his Faculty.

### Participants

The participants comprised the total intake of 36 first year on-campus students, between the ages 19-43, relating to the description of the Virtual Generation who belong to multiple demographic age groups that make social connections online through virtual worlds (Samer quoted by Havenstein, 2007). They were registered for a qualification in the Humanities (Table 1). The researchers determined the students' competency levels according to the Computer Attitude Survey (CAS) (Loyd and Gressard, 1984). Loyd and Gressard (1984) claim that the instrument is an effective, reliable, and convenient means of measuring student attitudes toward learning about and using computers. Although the extended CAS findings are not reported in this paper, they provided background information about the students (Table 1), as well as a rationale for the selection of interview participants (Table 2). Three

questions of the CAS provided selection criteria for the selection of purposefully selected participants for the interviews, i.e. the students' perceptions of their (i) competency, (ii) computer confidence, and (iii) preference to use computers.

TABLE 1 STUDENT PARTICIPANTS' DEMOGRAPHICAL INFORMATION (N=36)

Language	Gender	Age Groups					Total
		19-24	25-29	30-34	35-39	40-45	
Afrikaans	Females	8	-	-	-	-	8
Afrikaans	Males	18	1	1	2	-	22
English	Males	-	-	1	-	-	1
isiXhosa	Males	-	2	-	-	-	2
Shona	Males	-	-	1	-	1	2
Chicewa	Males	-	1	-	-	-	1
Total:		26	4	3	2	1	36
Percentage of total:		72%	11%	8%	6%	3%	

TABLE 2 CAS ASPECTS USED DURING PURPOSEFUL SELECTION OF INTERVIEW PARTICIPANTS

Student	Gender	Age	Competency*	Computer Confidence**	Like Using Computers**
1	Male	19	1	3	5
2	Male	18	1	2	5
3	Male	42	2	4	4
4	Female	18	2	4	4
5	Male	27	3	5	5
6	Female	20	3	5	4

\*1 = Poor; 2 = Average; 3 = Excellent

\*\*1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree

### Methods

The study followed a qualitative case study design to ensure insight, discovery, holistic descriptions, and an increased understanding of the phenomena at hand (Merriam, 1998; 2009; Leech and Onwuegbuzie, 2007). The researchers collected data at several occasions over a period of one year according to five strategies:

- (i) An interview with the Dean of the faculty which focussed on his strategic views on the establishing and implementation of a TEL environment.
- (ii) Semi-structured individual interviews with six purposefully selected students (Table 2). The questions focused on students' expectations, their experiences and their use of the technology for academic or other purposes.
- (iii) A semi-structured focus group discussion with lecturers focussing on the integration of technology into teaching and learning.
- (iv) A semi-structured focus group discussion with

seven first-year students that focussed on how technology supported their learning.

- (v) An open-ended questionnaire posted to the learning-management system for all 36 participants, although only fourteen students responded to the questionnaire.

**Data Analysis**

Atlas.ti™, a qualitative data analysis and research software, combined the textual data from the five data collection strategies as an integrated dataset (comprising interviews with management, lecturers and students) in order to determine the success of the first-time use of TEL in a specific course. The first author coded and categorized the participants’ responses into 180 codes, eleven categories, and four themes (Figure 1) according to the use of the constant comparative analysis method (Leech and Onwuegbuzie, 2007, 2008). This method identifies underlying themes from the data. The researcher grouped phrases together as meaningful parts and linked them with a code, and then paired subsequent chunks of text with existing codes. Codes were grouped together due to their similarity as categories, and then as themes (Figure 1).

**Findings**

The findings are presented according to the four categories identified from the data: (i) students’ experiences of technology; (ii) improving teaching and learning; (iii) technology issues; and (iv) thoughts on the pilot project.

**Students’ Experience of Technology**

Four themes relate to the category of students’ experiences of technology: Initial thoughts, use, expectations, and

comperacy.

**1) Initial Thoughts**

At the start of the course, several students felt nervous to use the laptops, but their perceived usefulness (the expectation that using technology would assist them in some way (Abbad, Morris, and de Nahlik, 2009) generated excitement, fostered interest in the laptops, and each student explored the learning tool for its numerous possibilities. However, accepting ownership and abiding by the faculty’s rules for using the laptops, created feelings of uncertainty. The added responsibilities caused over-cautiousness and initial use dwindled:

*I borrowed study guides, or printed them out, and mostly left the computer at home. I travel to classes by bicycle and am usually pressed for time; so to open and set up the computer each time, and to ride with the added weight, simply did not seem worthwhile to me (Student, open-ended questionnaire).*

**2) Use**

Use refers to the actual use (Davis, Bagozzi, and Warshaw, 1989) of laptops for teaching and learning. If students perceived technology as easy (Davis, Bagozzi, and Warshaw, 1989), acceptance would increase, which again might influence use, motivation, satisfaction and ultimately success (Bekele, 2010). Understanding the human issues relating to ICT could ensure effective e-learning adoption (Njenga and Fourie, 2010; Kirkwood and Price, 2005). The students valued their laptops for academic activities, i.e. typing assignments, making study notes, accessing resources, organising course material in one place, writing class tests, and communicating with peers and lecturers.

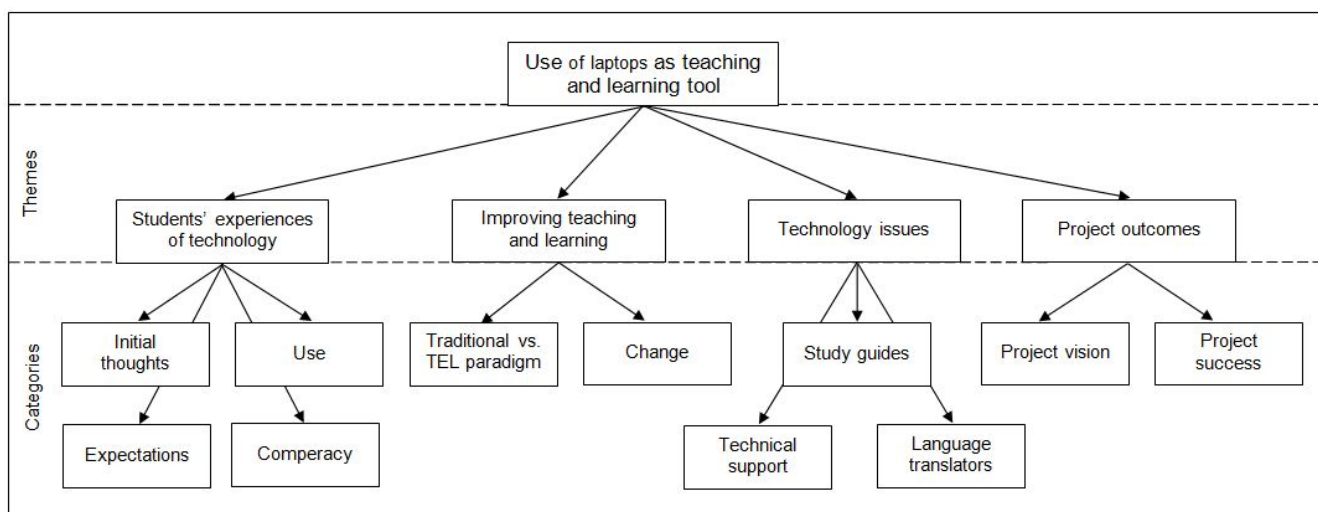


FIG. 1 CATEGORIES AND THEIR DISTINGUISHED THEMES RELATING TO THE USE OF LAPTOPS FOR TECHNOLOGY ENHANCED LEARNING AT A RESIDENTIAL HIGHER EDUCATION INSTITUTION

Direct communication with peers and lecturers mainly took place via e-Fundi, a dependable Sakai™-based e-learning platform (Fichter, 2005; Abbad, Morris, and de Nahlik, 2009). These not previously used ways of e-communication allowed lecturers and students to rapidly exchange information and ideas outside the boundaries of time and space:

*The fact that you can submit your assignments here; you can sit in any place in the building and quickly submit it. That is really convenient that you don't need to come to campus to hand it in a little box somewhere (Student, focus group discussion).*

e-Communication via the laptops satisfied the Virtual Generation's sense of immediacy (Proserpio and Gioia, 2007) as communication turn-around improved. The use of the laptops for surfing the Internet, listening to music, watching movies and playing games, provided ways for the students to teach themselves computer skills so that they became confident in the use of the technology for teaching and learning:

*Technology does not guarantee that the experience will improve. The potential is there if it is applied correctly. Technology has the potential to improve teaching (Student, individual interview).*

Disconcerting aspects of using the laptops during classes were:

- Uploading documents to and downloading from e-Fundi caused frustration
- Creating interruptions by inadequately maintained computers in lecturing halls
- Interacting with Facebook™ or playing games during lectures bothered peers and lecturers. Although a disturbance in class, social interaction overcame technophobia, anxiety, and nervousness about interacting with the technology
- Obtaining or maintaining students' attention while they were interacting with their laptops disrupted lectures. Lecturers asserted that the laptops distracted students' attention in classes and that students required maturity and discipline to focus their attention.
- Perceiving the usability of study guides not explicitly designed for a TEL environment as low.

### 3) *Expectations*

The students experienced that (i) both the laptop

and the (ii) technical support were of high quality. They considered themselves (iii) privileged to be part of the pilot group. They also expected that the TEL environment would (iv) enhance their comperacy in order to introduce new ways of learning:

*I want to do well in my academic work. I want to learn, to master, all possible learning techniques that I can manage. The computer also helps one, because it's another one types, and that is different from writing. I type slowly, and ten to one I remember more things, and I re-read everything again. The better I look at my notes, the better I will remember, as opposed to rushing something off or just doing it quickly without checking if everything is correct (Student, individual interview).*

However, the total shift towards TEL overwhelmed some students. Lecturers, not from the Virtual Generation, voiced their concerns that the pilot project was too much, and too fast, not taking into account the technology preferences of the Virtual Generation:

*I was affected in a huge way, when I was used to taking note on paper and now it is done on the laptops it's a big change which on the other hand it slows you down, because I'm still getting used to the typing (Student, open-ended questionnaire).*

*I will think that maybe a soft approach could have worked better. What is that? Optional. Give a student a chance to say a paper works best for me and this is what I want to follow. Someone can come and say a computer will work best for me. But the way it was introduced, we were left with no choice. It became a bit of traumatic to get in the system so quickly (Lecturer, focus group discussion).*

In spite of the challenges, some students, lecturers and faculty management believed that TEL could contribute towards an improved teaching and learning experience:

*Improvement of teaching and learning is like that, it can lie within effective access to information that one has as result of this teaching aid (Management, individual interview).*

### 4) *Comperacy*

Comperacy denotes the skill set required for computer literacy (McMillan, 1996). Basic comperacy (Blignaut and Els, 2010) is a requirement for effective TEL. Those students identified through the CAS as already competent, experienced the

transition from paper-based learning to learning with technology positively. This finding echoes Kay's findings (2008) that technological knowledge and skills increase students' satisfaction when confronted with TEL. However, lecturers pronounced that it was not their responsibility to teach comperacy to students and viewed TEL as an additional burden that delays student development:

*The students needed the proper preparation to use this tool, because I think instead of helping, it's not...it can't progress to their full potential at the moment it's not going to work well especially with the languages (Lecturer, focus group discussion).*

The compulsory TEL environment increased students' comperacy and they expected that the experience was preparing them for a digital professional development in the information age:

*It prepares me to work in any circumstance one day, because in your work you will most probably use technology. It actually gives us that little bit of edge in order to make progress (Student, individual interview).*

### **Improvement of Teaching and Learning**

The category improvement of teaching and learning originated from two themes: (i) Traditional versus a technology-enhanced learning paradigm, and (ii) change.

#### **1) Traditional Versus a TEL Paradigm**

The Dean of the faculty conceded irrevocable changes in HE, evolving towards student-centred approaches. Lecturers were no longer considered as the *sage on the stage* (Palloff and Pratt, 2003), with students perched at their feet, ready to absorb any knowledge. Lecturers should evolve to *guides on the side* (Palloff and Pratt, 2003) who holistically share in the teaching learning experiences of their students. However, not all lecturers shared this progression and they strongly voiced their traditionalist defiance:

*When I stand up and say: In Greek it won't work in our environment! Someone will stand up and say: make it work, and you see now there is a struggle I must make something to work while time is passing by. I must reach my outcomes. There are outcomes to be achieved and someone says make it work and I say it's not working and we are wasting time by this argument its working, make it work, it's not working, make it work and so forth and where is the process of*

*teaching and learning it's being hurt (Lecturer, focus group discussion).*

#### **2) Change**

Some lecturers had little confidence in the required change towards their new roles while integrating TEL in their teaching and learning. Traditional study guides set out teaching outcomes and they acknowledge the responsibility to adhere to and reach these outcomes during a contact session. This stance compromises the ideals of TEL and illustrates resistance to change:

*I did not make any mind shift. My preparations remained the same. I teach or lecture the same way while I will communicate with them through e-Fundi and all that, but my contact session is Greek, it's a language contact session. I need them...its more contact than face to face. The computer thing and so forth, I think it creates a gap most especially when it comes to learning the language (Lecturer, focus group discussion).*

However, after the first year of the pilot project, the effect of TEL on students' overall teaching and learning experience was not yet clear. Much uncertainty prevailed. The in-class use of the laptops diminished the interactivity with course content during contact sessions and estranged social interaction in real time and space:

*I feel that a contact session, in the deepest sense of the word, it must be a face to face talk and then questioning and answering, discussing, rather than a communication by passing through the computer (Lecturer, focus group discussion).*

*The important things or the extra things the lecturer said are not in the study guide. I think to do this electronically is hard. I have tried it, but I just get behind so quickly, because the lecturer is going very quickly through the lesson so you need to be very sharp and very quick to do that (Student, focus group discussion).*

Students valued how TEL structured and simplified in-class teaching and learning:

*Lecturers send us the Power Points and things and so it makes the learning process easier because you everything they know you have the computer, so they can send it to you (Student, individual interview).*

### **Technology Problems**

The technological problems experienced by the participants are explained by the following three

themes: Study guides, language translators and technical support.

### 1) Study Guides

The students shared numerous concerns regarding the use of electronic study guides. Due to their portable display format (PDF), students could not make notes directly onto the documents. Mistakes on the electronic study guides could also not be corrected. Students perceived reading from a computer screen as slower than from paper and more strenuous to their eyes. They had also not mastered the skill of finding specific sections and pages efficiently and only used the electronic versions as back-up when hard copies were not available. They blamed their insufficient competency as token of fallible man-machine interaction:

*Especially when you walk into class and then you need to start the lesson and you're at study unit ten and you open your study guide at page Roman one and then you have to go page by page to page 110 and by that time you're already behind with the lecture (Student, focus group discussion).*

Students preferred hard-copy study guides for class preparation, taking notes, and test preparation. Highlighting of sections and making of additional notes on the document are remains from traditional learning methods. Providing students with software to enable these functionalities, as well as other enhancing functions, could diminish their need for unnecessary printing of hard copies:

*Students cannot make, take notes when they are busy with laptops. You say a lot of things and they are unable to do that, because even if he tries to take notes...you are speaking the third sentence and he's still trying to remember what you said because he wants to write those notes (Lecturer, focus group discussion).*

In cases where lecturers whole-heartedly adopted TEL and adapted their study guides for TEL, students accepted the electronic study guides with enthusiasm:

*Most of the modules the electronic study guides are very, very nice like New Testament last semester. There was questions asked and you type in the answer in the box provided and that worked very well for me (Student, focus group discussion).*

### 2) Language Translators

English-speaking students experienced an additional cognitive load by paying attention to a lecturer,

listening to translations via earphones, and at the same time trying to keep up with TEL. Wurst *et al.* (2008) point out that multitasking activities associated with laptop use in classrooms contribute towards students' course dissatisfaction:

*The translation is a little bit difficult. Translators and lecturers are sometimes miles apart; therefore it is difficult to connect these events. The lecturer would explain the nitty-gritty stuff in the study guide and the explanation doesn't get to me directly it goes via the second person. The lecturer has his own pace and the interpreter who's not know the material well will take some time to come up with point the lecturer conveyed. I think I am missing some of the work. It is affecting my learning experience in class. Not getting the whole explanation of a subject you're introduced to affect your understanding of that subject is also mediocre (Student, individual interview).*

### 3) Technical Support

Technical support is one of the important factors, especially in the beginning stage of technology adoption, in determining the acceptance of technology for teaching and learning (Abbad, Morris, and de Nahlik, 2009). Technical problems students experienced mainly related to access to the Wi-Fi network, e-Fundi, and the study guides. The faculty provided dedicated technical support to all participants in the pilot project. The technical staff provided virtual support, as well as support in real time and space which also enhanced social interaction. A positive spin-off was that students, who had not known one another before, started helping one another. All participants valued the cardinal importance of the technical support:

*A motivation point was to attempt to clear away the hurdles which lecturers put in the way in reality or perceptually. For example, I don't know how e-Fundi works. No problem, an assistant is available for you full time. Just call him, and he will assist you with your first e-Fundi (Management, individual interview).*

### Pilot Project Outcomes

Two distinct themes define the opinions on the pilot project outcomes: Project success, and motivation for the project.

#### 1) Project Success

The success of the pilot project depended on the initial project preparation, which included thorough research of the system requirements to

adopt TEL. The lecturers agreed that the success of the pilot project depended on their positive attitude and change towards teaching philosophy according to the demands of TEL. However, from their long-standing competence of teaching well without the use of technology, lecturers shared a strong sense of reluctance due to their uncertainty with the ultimate value of TEL, as well as their competencies to interact with students via TEL. Students' enhanced teaching and learning experience was the major determinant to adopt the new approach:

*It seems to me as if in the first we have to buy the idea of an e-learning environment, and it must be motivated and it must be clear that this is the ideal, this is the best, in other words, it should happen within people's heads (Student, focus group discussion).*

## 2) *Insufficient Motivation for the Project*

Adoption of TEL takes effort and careful consideration. A partnership between all role players is vital before taking the plunge from traditional classroom-based teaching and learning to TEL. This aspect may be the most important aspect in successfully integrating TEL at traditional HEIs. Resistance to change is one of the most important stumbling blocks in implementing e-learning (Njenga and Fourie, 2010). Some project participants felt unconvinced about the rationale for the project and held the opinion that the project only served the possible financial gains that TEL may bring about for the HEI. This belief may not in all cases be true when infrastructural and recurrent costs are considered (Guri-Rosenblit, 2005):

*I'm challenging the whole question of saying it's cheaper. I think in the long run it's more expensive. If each and every student let's just imagine eleven thousand students in the university must have a laptop which cost more or less R9000. I don't think you can spend R9000 on eight study guides on your modules in a semester. Besides the whole question of copies and so forth they can use this e-Fundi to submit, but it will be more expensive also for the lecturer. I can't mark an assignment on the computer I know there are track changes you can do, but if that will be my daily work I'm going to lose my sight very soon and its more expensive than paper (Lecturer, focus group discussion).*

## Discussion

Changing a pedagogical paradigm is a daunting task.

A radical change requires careful consideration of system factors, *inter alia* environmental factors, participant humaneness, student readiness, and lecturer willingness. To effect change, these factors should be intercepted during the planning phase. The process should be collaborative in order to plan for optimal teaching and learning. All role-players should be involved in the system development: "The most important step is developing a commitment to the value of the approach, followed by some thought devoted to ways to best blend technology with the traditional classroom practices" (Proserpio & Gioia, 2007, p. 79).

The recent use of social media Internet technologies, e.g. learning management systems, when working collaboratively with students have proven effective and sufficient. "The key elements of learning processes are the interactions among students themselves, the interactions between faculty and students, and the collaboration in learning that results from these interactions (System interactivity)" (Abbad, Morris, and de Nahlik, 2009, p. 4). Interactivity and user involvement are key elements in TEL success (Proserpio and Gioia, 2007). Therefore, one cannot limit the human interaction necessary for meaningful learning to the exclusive use of computers.

Students' reactions to modern teaching technologies differ, but initial excitement, positivity and interest in ICTs should be retained as students' attitude towards TEL and the acceptance thereof depended on the students' perceptions of the technologies. Davis proclaims that actual use can improve performance (Davis, Bagozzi, and Warshaw, 1989). Both ease and usefulness depend on how lecturers design the classroom experience and not on the technology itself. "Having faculty properly trained to effectively integrate technology into their lessons is vital in having students feel satisfied with their education" (Wurst, Smarkola, and Gaffney, 2008, p. 1774).

Laptop initiatives at various HEIs continue to grow (Weaver and Nilson, 2005). Laptops could be an important learning tool (Kay, 2008) and enhance participation and interaction (Stephens, 2005; Weaver and Nilson, 2005). However, it is not yet clear if the in-class usage of laptops supports or hinders learning. In some cases they get in the way of learning (Wurst, Smarkola, and Gaffney, 2008; Fried, 2008). Laptops particularly distract and interfere with students' ability to pay attention to lecturers (Fried, 2008). Lecturers have to plan ahead, consider controlling measures, as well as augment stereotypical classroom



teaching. Adding multiple technologies may split students' attention and diminish understanding (Mayer, Heiser, and Lonn, 2001).

The convenience of a laptop to instantaneously access information and to organise documents, and the ability to communicate directly with the lecturers, were the learning aspects from which students benefited mostly. Previously inaccessible information at students' fingertips could enrich their learning experiences, yet did not replace the distinction between information and knowledge (Guri-Rosenblit, 2005). According to Wurst et al, (2008), the responsibility fell on lecturers to devise learning strategies to ensure that students benefited from instant access to data. Lecturers were confronted with the change relating to their traditional roles as facilitators to managers of learning in order to ensure the attainment of constructivist learning. "One's capability to interact with a given technology plays a significant role in one's expectations and performance" (Tang & Austin, 2009, p. 1242). Although students indicated in the CAS that they were able to work with computers and found it relatively easy to do so, they struggled to use the technology effectively in classrooms. A certain degree of comperacy was needed to enhance their teaching and learning experience (Blignaut and Els, 2010).

Management initiated the laptop initiative, but during the first year of the rollout, lecturers did not fully buy into the change. They were uncertain about the advantages of the endeavour for the students, and they also felt that more research should have been done before initiation. Lecturers have not yet made a mind-shift towards the use and usefulness of ever-present learning technologies. Njenga and Fourie (2010) warn against the unprepared adoption of ICTs in education which will always lead to mixed results when clear guidelines are not available. Njenga and Fourie are of the opinion that not all motives, rewards and promises of TEL to enhance the students' experience have as yet been explored. Technology should be a means to an end, but should be integrated with pedagogy in a way that would enhance all aspects of education.

## Conclusions

After the first line of inspection the researchers regrouped the findings according to the four themes as indicated in Figure 1 as issues for the HEI to consider during the implementation of TELHE for on-

campus delivery of HE. Six new issues emerged (Figure 2) as two triangles of which the solid coloured triangle remains most important: the *students*, the *material*, and the *lecturer(s)*. The second triangle constitutes the backdrop for TEL: e-communication, access, and comperacy.

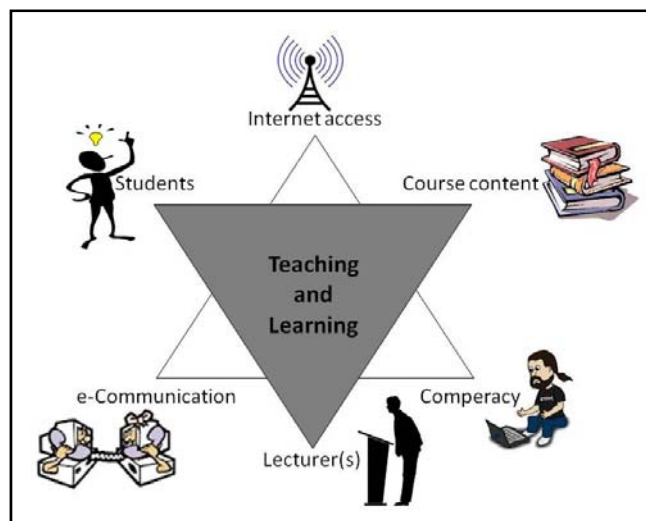


FIG. 2 FRAMEWORK FOR ON-CAMPUS TECHNOLOGY ENHANCED LEARNING

### Students

Gradually move students into a TEL environment, as an on-going introduction to TEL provides better success. Cognitive overload due to multiple technologies in a lecture hall decreases student performance, diminishes understanding of the content, and lowers student satisfaction. Some students demonstrated resistance to change by preferring the traditional learning methods.

### Course Content

Learning material like study guides should specifically be developed for the TEL environment as mere paper-behind-glass does not improve interaction with learning material. Study preferences and study methods should match the mode of course delivery.

### Lecturer(s)

Top-down decision making creates resistance and negative attitudes in lecturers. Lecturers have the need to be involved from the initiation phase of TEL to become a motivated and transformed teaching corps. Although change of classroom pedagogy is probably inevitable, many lecturers show strong defiance. They are not yet comfortable with their new pedagogical roles required for TEL and should be trained for using TEL. Resistance to change is the most important

stumbling block in implementing TEL.

### ***E-Communication***

The instantaneous student-lecturer communication aspect contributed towards student satisfaction. Students liked the equalised opportunities to send and receive information at hours convenient to them and be able to discuss the outcomes of the assignments with them online.

### ***Internet Access***

Poorly maintained computers in lecture halls, students' distraction by the use of other applications during classes, reading from computer screens, and competing for students' attention during classes challenged lecturers' adoption of TEL. Restricting Internet during classes could be considered, but such restrictions could have negative repercussions like exaggerated lecturer control and diminished student motivation.

### ***Comperacy***

Most of the students learned new skills that enhanced their comperacy. Initial nervousness and uncertainty did not lead to demotivation and abandonment of the laptops. Students used laptops according to their preferences: in classrooms, only at home, or between classes. To move TEL beyond mere convenience use, lecturers will have to be much more creative and effective in classrooms to compete with the affordances of digital media.

In summary, although this study has indicated various dimensions to be considered while HEIs take the plunge of implementation TEL across traditionally classroom-based environments, the interrelatedness of students, lecturers and course materials all come under scrutiny while addressing new teaching and learning roles.

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